"A COMPARATIVE STUDY TO FIND THE EFFICACY OF TILT TABLE STRETCH VERSUS MANUAL STRETCHING OF SPASTIC CALF MUSCLES IN PATIENTS WITH HEMIPLEGIA"

A Dissertation Submitted To

THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY

CHENNAI

In partial fulfillment of the requirements for the awards of the

MASTER OF PHYSIOTHERAPY DEGREE

PHYSIOTHERAPY IN NEUROLOGY

Submitted by

Reg. No. 271520062

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Dissertation evaluated on …….

Internal Examiner External Examiner

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I wish him a great success in his dissertation work.

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Place :Erode Guide Signature

Date :

DECLARATION

I hereby and present my project work entitled **"A COMPARATIVE STUDY TO FIND THE EFFICACY OF TILT TABLE STRETCH VERSUS MANUAL STRETCHING OF SPASTIC CALF MUSCLES INPATIENTS WITHHEMIPLEGIA."** is outcome of original research work was undertaken and carried out by me under the guidance of **Prof.V.VIJAYARAJM.P.T(Neuro).,M(Acu).,DVMS., MIAP.,**

To the best of my knowledge this dissertation has not been formed in any other basic for the award of any other degree, diploma, associateship, fellowship, preciously from any other medical university.

Reg.No.271520062

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I am very happy to express my heartfelt thanks to the **GOD** almighty giving me strength and wisdom in successfully completing this project work in an efficient manner.

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I also have much gratitude to **my FRIENDS** for their known interest and in my academic excellence.

Last but not the least, I would like to pay my gratitude to **My Parents & Brother**who always had so much confidence in me and always provided me with a constant silent support, encouragement and inspiration.

PREFACE

It was immense pleasure for me to present this project work on **"A COMPARATIVE STUDY TO FIND THE EFFICACY OF TILT TABLE STRETCH VERSUS MANUAL STRETCHING OF SPASTIC CALF MUSCLES INPATIENTS WITHHEMIPLEGIA"**because this opportunity made me learn a lot about this condition.

I have done this work with my best level by referring many Neurological books, journals and websites. I have assessed and given treatment to patient to improve their condition. I believe this project work will prove to be very useful for the physiotherapists to give a better knowledge while assessing and treating stroke patients.

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CHAPTER – 1

INTRODUCTION

1.1-INTRODUCTION

Stroke refers to the sudden death of some brain cells due to a lack of oxygen when the blood flow to the brain is impaired by blockage or rupture of an artery to the brain. According to**WHO** Stroke is defined as 'a focal neurological (or at times global) impairment of sudden onset and lasting more than 24 hours (or leading to death) and of presumed vascular origin.

Like the definition proposed by WHO for Stroke by demarcating with Transient Ischaemic Attack (which lasts for less than 24 hours) **the Journal of Clinical Epidemiology** also defined Stroke as a syndrome characterized by "rapidly developing clinical signs of focal (or global) disturbance lasting 24 hours or longer or leading to death with no apparent cause other than of vascular origin".

In simple words Stroke can be understood, as an acute onset of neurological dysfunction due to abnormality in cerebral circulation with resultant signs and symptoms that correspond to involvement of focal areas of the brain. Stroke may be manifested as Hemiplegia, which is the paralysis of muscles of one side of the body, contralateral to the side of the brain in which CVA occurred. Clinically a variety of deficits are possible including the changes in the level of consciousness, impairments of sensory, motor, cognitive, perceptual and language functions. The location of lesion, the extent of lesion, the amount of collateral blood flow and early acute care management determine the severity of neurological deficits.

The impairment resulted due to Stroke may resolve spontaneously with neurological recovery (Reversible Ischemic Neurological Deficit) generally within 3 weeks. Residual neurological impairments are those that persist longer than 3 weeks and may lead to permanent disability and dependence.

EPIDEMIOLOGY

Stroke has been identified as a major public health problem in recent decades in India due to it's

(1) Increasing incidence

(2) High mortality, morbidity and disability

(3) Increasing occurrence due to general increase in prevalence of associated health problems like hypertension, diabetes, alcoholism etc.,

(4) An ageing population

A study conducted in **National Institute of Mental Health and Neuro Sciences, Bangalore** quoted about the registration of types of Strokes such as Transient Ischaemic Attacks, Ischaemic Stroke and Haemorrhagic Strokes as 14.7%, 73% and 12% respectively.

Incidence:

Incidence is an epidemiological tool, which is defined as the frequency of new occurrences of disease within a defined time interval. Incidence rate is the number of new cases of a specified disease divided by the number of people in a population over a specified period of time, usually one year.The worldwide incidence of Stroke has been quoted as 2/1000 population / year; about 4/1000 in people aged 45-84 years. In India the incidence of Stroke was found to be 13/1, 00,000 population / year in a study conducted at Vellore in 1969-1971 and 33/1, 00,000 / year in a study conducted at Rohtak.The incidence of Stroke increases dramatically with age, doubling every decade after 55 years of age. 28% of Stroke occurs in individuals under the age of 65

years. The incidence of Stroke is about 19% higher for males than females. In United States of America, each year about 7, 00,000 people suffer a Stroke. About 5, 00,000 of these are first attacks and 2, 00,000 are recurrent attacks. Stroke is also viewed as a socioeconomic problem in a study on young Stroke patients. They mentioned Stroke as one of the foremost causes of morbidity and mortality and pose a major socioeconomic problem in young patients especially in developing countries. A Stroke survivor has a 20% chance of having another Stroke within 2 years.

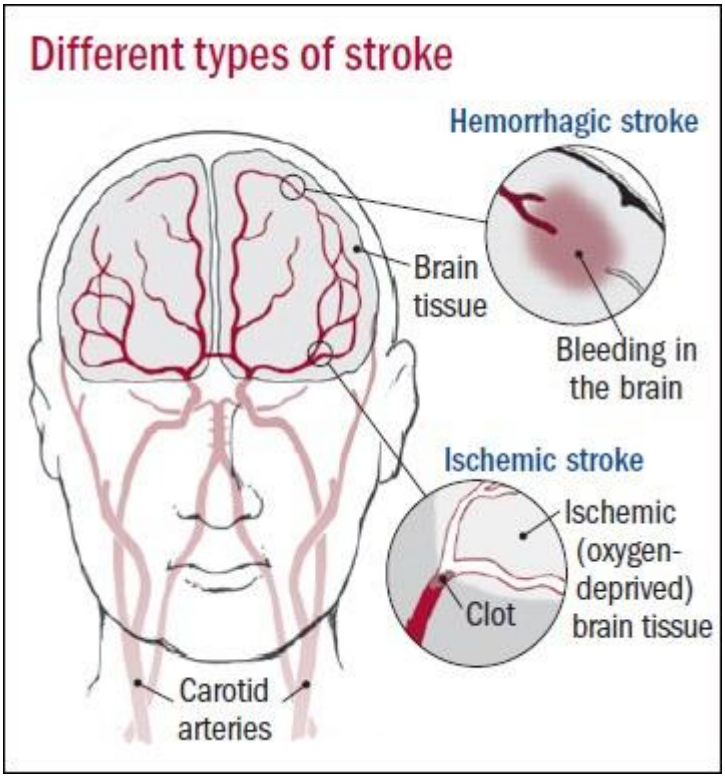


Fig: 1:1 Types of stroke

Pathophysiology in Hemiplegia:

Interruption of blood flow for only few minutes sets in motion a series of pathoneurologic events. Complete cerebral circulatory arrest results in irreversible cellular damage with a core of focal infraction. The area surrounding the core is termed as ischaemic penumbra and consists of variable but metabolically lethargic cells. The ischemia triggers a number of damaging and potentially reversible events including the release of cascades of chemicals. The release of excess glutamates, and excitatory neurotransmitter, causes changes in calcium ion distribution with the activation of destructive enzyme. The overall effect is one of additional neuronal death, generally within hours and extention of infraction into penumbra area.

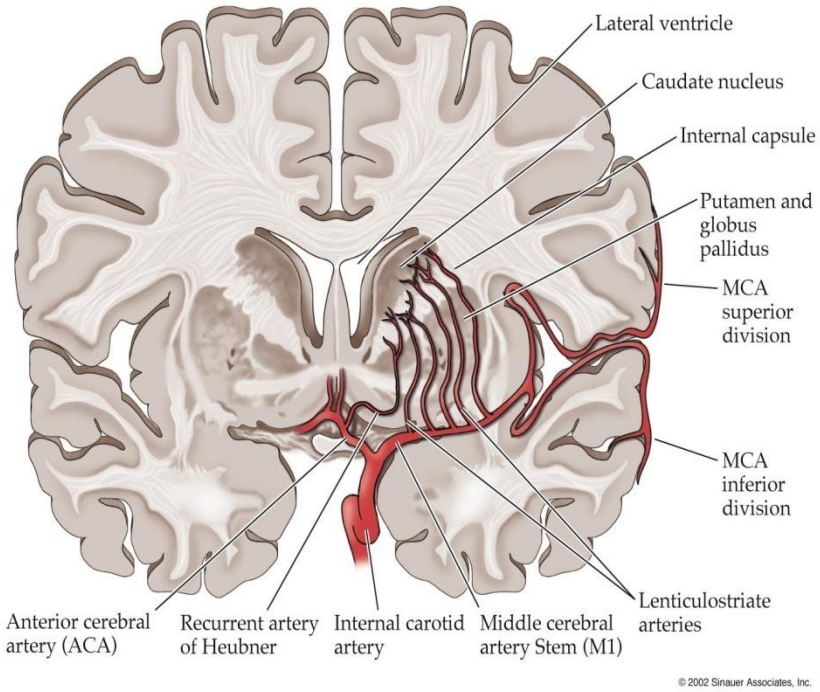


Fig: 1.2 Supply of Middle Cerebral Artery

Prevalence:

Prevalence is the total number of persons living with a specific disease or condition at a given time.The prevalence is approximately 2 per 1000 with the outcome being death within the first 3 weeks in approximately 30% of all cases, full recovery in 30% and residual disability in 40%. There is lack of reliable information on Stroke epidemiology for the Indian Sub-continent and its mortality and morbidity patterns. However community surveys from different regions of India show a crude prevalence rate of Strokes presume to be of vascular origin in the range of 200/1,00,000 population. The prevalence of Stroke in Bangalore is 151/1,00,000 population.

Mortality:

Mortality is the ratio of the total number of deaths to the total population. Stroke is the third commonest cause of mortality after heart diseases and cancer. On average someone in the United States of America suffers a Stroke every 45 seconds; every 3 minutes someone dies of Stroke. In Canada, Stroke is the fourth leading cause of death. Over 50,000 Strokes each year including 16,000 deaths were reported. In the west, Stroke is represented as the third leading cause of death with an overall prevalence rate of 800/1, 00,000 populations. WHO conducted a study in 1990 and quoted the mortality rate in India to be 73/1, 00,000 per year.The rate of death is increased in individuals aged 65 or older. The type of Stroke is significant in determining survival of the patients. Patients with intracerebralhaemorrhage account for the largest number of deaths following an episode (59% to 72% at 3 months) followed by Subarachnoid haemorrhage (43% at 3 months) and thromboembolic Stroke (30% at 3 months). 8%-12% of ischaemic Stroke and 37%-38% of haemorrhagic Strokes result in death within 30 days. 8% of men and 11% of women will have a Stroke within 6 years after heart attack. 14% of people who have a Stroke or Transient Ischaemic Attack will have a Stroke within a year. 22% of men and 25%

of women who have an initial Stroke die within a year. Factors associated with adverse outcome in Stroke included male sex, unconsciousness, Glasgow Coma Scale <3, gaze palsy, pupillary changes and incontinence.

Morbidity:

Morbidity is said to be the impact of a disease on health. of survivors 30% to 40% will have significant disability and 30% of people are able to return to their normal activities. Epidemiological studies reveal a steady decline in the last 35 years especially last decade.

RISK FACTORS

Stroke is a multi factorial disease where many determinants have been described. These determinants or risk factors can be divided into modifiable and non-modifiable.

Non-modifiable risk factors

Age and Sex are examples of two well-known risk factors for Stroke; high age and male sex are in many populations associated with an increased risk. 2/3 of all Strokes occur in people older than the age of 65; and after 55, the risk of Stroke doubles every 10 years. Although they are of major importance in predicting the occurrence of Stroke in the community, they cannot be modified.

Modifiable risk factors:

In contrast, reduction in the exposure to modifiable risk factors may lead to a lower occurrence of Stroke such as tobacco chewing, smoking, physical inactivity, diet or factors in the environment such as passive smoking and access to medical

treatment**.**The combination of these risk factors, which do not all have to be present, will over time influence the subject's likelihood of suffering a Stroke.

OVERVIEW

Impairments:

Stroke results in some structural and functional alterations, which are termed as impairments. They may be primary or secondary impairments.

(a) Primary impairments:

- Sensory deficits
- Pain
- Visual defects
- Altered muscle tone
- Abnormal synergy patterns
- Altered reflexes
- Weakness
- Balance disorders
- Speech disorders
- Swallowing difficulties
- Perceptual dysfunctions
- Emotional disturbances
- Seizures
- Bladder and bowel dysfunction

(b) Secondary impairments:

- ❖ Venous thromboembolism
- ❖ Skin breakdown
- ❖ Decreased flexibility of joints
- ❖ Shoulder subluxation
- ❖ Reflex sympathetic dystrophy.

Sensation is frequently impaired but rarely absent on hemiplegic side. Sensory deficits are reported in about 53% of patients with Stroke. In one study 44% of patients with Stroke demonstrated significant proprioceptive loss with associated impairments. Pain may be present due to direct involvement of thalamus or it may be caused indirectly due to muscle imbalances, impaired movement patterns and poor alignments.Visual defects may be present in 26% of patients with Stroke. Muscle tone is altered into flaccidity immediately after Stroke. Later the tone will be altered into spasticity in 90% of cases. Abnormal synergy patterns may restrict the patient's ability to move an isolated segment of affected limb without producing movements in the remainder of the limb. Deep tendon reflexes are sluggish or absent at early stages and exaggerated when spasticity develops. Primitive or tonic reflex patterns may appear. Weakness is found in 80% to 90% of all patients after Stroke. Incoordination of movements may occur. Balance is also frequently disturbed following Stroke. Aphasia and dysarthria may present 30 and 40 percent of cases respectively. Dysphagia is present in about 12% of patients with Stroke. Perceptual dysfunction has been reported in 32% to 41% of cases especially in right

hemispheric lesions. Cognitive dysfunction, emotional disturbances and seizures may also occur. Bladder and bowel dysfunctions are common during the acute phase, occurring in about 29% of cases.

The above-mentioned problems result in increase the level of activity limitation and participation limitation progressively in various aspects of one's functional activities. Thus impairments indirectly influence a patients' participation level in personal and social activities through its one or few components. From the above-mentioned impairments one of the commonest and more disabling impairments in patients with Stroke is weakness. Weakness following Stroke is referred to as either mild to moderate (hemiparesis) degree of weakness or severe or complete loss of motor function (hemiplegia) on one side of the body. Weakness is a prominent finding in a variety of central and peripheral neurological disorders, as well as aging, all of which are conditions involving immobilization or markedly decreased physical activity and all of which typically involve other systemic clinical conditions.

The capacity to produce muscle force or strength involves

1. Structural factors, i.e., muscle size: Muscle mass or cross-sectional area (CSA), which depends on the number, size, and relative proportions of muscle fiber types.
2. Mechanical factors, including the length-tension and force-velocity relationships of muscle.
3. Neural factors, i.e., the capacity of the nervous system to activate muscle through motor unit recruitment and rate coding.

However, evidence is now emerging that weakness also occurs on the "uninvolved," or ipsi-lesional side (traditionally termed as the "nonparetic"), within a short time frame postacute Stroke.

Facets of weakness

- Impaired force magnitude
- Slowness to produce movement.
- Rapid onset of fatigue.
- Excessive sense of effort.
- Difficulty with producing force effectively within the context of a task.

The upper-motor neuron syndrome as described by **John Hughlings Jackson** involves a combination of negative signs-weakness and impaired dexterity or coordination-and positive signs-spasticity or hyperreflexia. Early approaches to neurorehabilitation emphasized treatment from the perspective of diminishing positive Jacksonian signs and focused on techniques to normalize tone, facilitate normal patterns of movement, and decrease co-contraction of paired antagonist muscles. A fundamental tenet of this perspective was the broadly held belief that intense, effortful, or high-exertion activities exacerbate hypertonia and reinforce aberrant motor pathways. Effortful activities were thus prescribed in the therapeutic regime for neurologic patients. But Weakness presents a more serious compromise to movement function in Post Stroke hemiplegia than spasticity.A substantial body of evidence now exists to demonstrate that exaggerated resistance to passive movement, traditionally

termed "spasticity" or "hypertonia," involves changes in the passive mechanical properties of the muscle-tendon complex. These muscle and tissue changes may be more profound than either change in the reflex threshold or alterations in intrinsic motor neuron excitability, which traditionally were believed to cause hyperactive stretch reflexes. Indeed, such changes in passive tissue properties may have a compensatory role and may possibly simplify movement control or optimize compromised motor function. Moreover, multiple investigators have now soundly refuted the fundamental tenet that effortful exercise exacerbates spasticity.

Distribution of Post Stroke Weakness

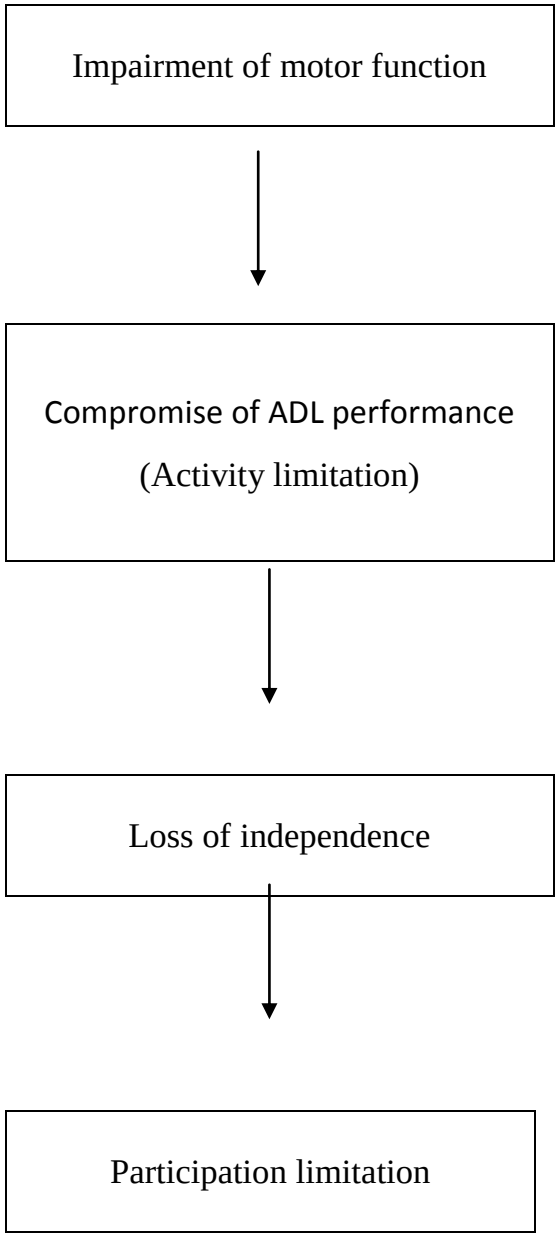
The distribution of Post Stroke weakness has been described following various investigations. **Adams and coworkers** assessed 20 patients with moderate to severe Hemiplegia and found that the mean degree of strength in the involved limb varied from 23 to 94 percent of that on the ipsilesional side.

The average degree of weakness showed that the residual strength was 37 percent for ankle plantar flexion, 45 percent for ankle dorsiflexion, 51 percent for knee extension, 53 percent for knee flexion, 64 percent for hip extension, and 68 percent for hip flexion, indicating that following Stroke, weakness is more pronounced distally than proximally. **Bohannon and Andrews** studied bilateral isometric strength in 48 hemiplegic persons across eight muscle actions. Most of the strength measures correlated significantly with one another, indicating that Post Stroke weakness

demonstrated in one muscle action will reflect weakness in other muscle actions. These findings were extended by investigating 16 subjects with minor motor impairment following a Stroke. It was found that isovelocity torque in the paretic leg was reduced 9 to 29 percent relative to the ipsilesional leg. While attention in Post Stroke hemiplegia generally focuses on paretic limb weakness, recently reported findings describe significant weakness in the ipsilesional side as early as 1 week following Stroke.

Functional consequences of Post Stroke weakness:

A direct causal relationship between strength or weakness and motor function has not been established. Traditionally, a strong bias has existed against quantifying strength in hemiplegic persons. As a result, the majority of clinical research in this population has focused on outcome measures at the activity and participation levels. Despite this, several available reports correlate strength with various functional activities, such that taken together; evidence strongly suggests impaired strength may play a prominent role in compromised functional performance.



The primary concern addressed in physical rehabilitation is restoration of the requisite motor function to perform the myriad of tasks encountered in daily life. These tasks range from grasping, reaching, and manipulation to more physical demanding transitional movements and complex coordinated movements, such as locomotion. Common to these motor tasks is control of muscular force, which becomes compromised with central nervous system damage and manifests as impaired intersegmental coordination, hyperreflexia or spasticity, and unilateral weakness.

Constraint Induced Movement Therapy (CIMT) is a technique used in physical rehabilitation to treat individuals with decreased upper extremity function. It is based on research done by **Edward Taub** and is a form of rehabilitation therapy that improves upper extremity function in patients suffering from a stroke or other central nervous system complications by increasing the use of their affected upper limb. **CIMT** is based on the theory of "learned non-use," which develops, during the early stages following a stroke as the subjects begins to compensate for difficulty using the impaired limb by increased reliance on the intact limbs. This compensation has been shown to hinder recovery of the function in the impaired limb. **CIMT** encourages the use of the affected upper extremity with the goal of maximizing or restoring motor function, a technique known as "shaping". It is characterized by repetitions of a defined movement, such as picking up blocks and moving them toward a pail, in a series of trials. The objective of shaping is to alter motor behaviors by repetitive use of basic movement tasks, the difficulties of which are progressively increased. The subject should be motivated to perform even more optimally on the basis of the progressive improvement over trials.

NEED FOR THE STUDY

- Cerebrovascular accident is among the most frequent of all neurological disorder.
- The mortality and morbidity due to stroke is severe, various treatment have been valued for management of stroke.
- To understand the effect of CIMT.
- The stroke subjects are unable to use their affected arm in performing activities of daily living.
- CIMT appears to improve arm function in stroke patients.

AIM OF THE STUDY

To find the effectiveness Constraint Induced Movement Therapy to reverse the learned non use in hemiplegic upper extremity and improve functional activities in middle cerebral artery stroke patients.

OBJECTIVES OF THE STUDY

- To have in-depth knowledge on Hemiplegic upper extremity.
- To know constraint induced movement therapy.
- To assess the efficacy of constraint induced movement therapy.
- To increase the strength of the hemiplegic upper extremity.
- To decrease the reverse learned non-use.
- To improve the functional activities.

OPERATIONAL DEFINITIONS

STROKE

Rapidly developed clinical signs of focal or global disturbance of cerebral function lasting more than 24 hours or leading to death with 50 apparent cause other than vascular origin.

WHO

HEMIPLEGIA

Motor deficits are characterized by paralysis or weakness typically on one side of the body opposite to side of lesion.

Susan B.O Sullivan

CONSTRAINT INDUCED MOVEMENT THERAPY(CIMT)

CIMT is a form of rehabilitation therapy that improves upper extremity function in patients suffering from a stroke or other Central Nervous System complications by increasing the use of their affected upper limb.

Edward Tauband

VARIABLES OF THE STUDY

- **INDEPENDENT VARIABLES**

  Constraint Induced Movement Therapy

- **DEPENDENT VARIABLES**

Motor performance of upper extremity

ASSUMPTION

The study had been conducted assuming that Constraint induced movement therapy will improves the motor performance of arm in patients with MCA stroke.

PROJECTED OUTCOME

Based on the review of literature the outcome of my study will be that Constraint induced movement therapy will improves the motor performance of arm in patients with MCA stroke.

HYPOTHESIS

NULL HYPOTHESIS

It makes the research to be performed with in the premises of null hypothesis which stated as follows:

"There is no significant improvement in motor performance of upper extremity function following Constraint Induced Movement Therapy"

ALTERNATIVE HYPOTHESIS

Experimental hypothesis for this study can be stated as follows:

"There is significant improvement in motor performance of upper extremity function following Constraint Induced Movement Therapy."

CHAPTER – 2

REVIEW OF LITERATURE

REVIEW OF LITERATURE

1)Sirtoriet (2004)

Revealed that Application of constrained induced movement therapy with an individual with upper extremity hemiparesis after sustaining a cerebrovascular accident. Patient often fail to develepfull potential use of their unaffected upper extremity, perhaps due to "Learned non-use phenomenon".

2)R.Gatti et al (2003)

Reported Upper extremity hemiparesis is a leading cause of functional disability after stroke as it impairs performance of everyday life.

3)Walter G. Bradley (2002)

Has concluded that Ischemic stroke accounts for approximately 85% of all stroke and a common cause to death (or) disability in adults living in industrialized nations.

4)Anne. M Woodson et al(2002)

States that Abnormal patterns of muscle activation in hemiparetic patients is due to inability to conrol activation and deactivation of agonist-antagonist muscle pairs to produce rapid alternating movements

5) Catherine A Trombly(2002)

Concluded that Muscle weakness ranging from slight less than normal strength to total inability to active muscle is found in hemiplegia, so strengthening of hemiplegic upper extremity musculature is needed for patients.

6)Susan 'B'O Sullivan et al (2001)

States thatClinical manifestation of Middle Cerebral Artery includes involvement of upper extremity and face more than lower limb in stroke.

7)Boyd's et al (2001)

They suggest Constraint induced movement therapy (CIMT) program including restraint and massed practice aim to reverse the behavioural suppression of movement in the affected upper limb.

8)Morris et al (2001)

Revealed that Two different but linked mechanism are considered to be responsible for increased use of more affected extremities as a result of Constraint Induced Movement Therapy (CIMT) overcoming learned non-use and use dependent cortical re-organisation.

9) Edward Taub et al (2000)

Reported promising results of forced use therapy for two consecutive weeks is more effective than bimanual training based on Neuro Developmental Technique (NDT) in restoring dexterity and improving activities functioning in stroke patients.

10) Van der lee et al (1999)

Has concluded that several systemic reviews on exercise therapy in stroke rehabilitation indicate the more intensive may be beneficial. Therefore, it is not unlikely that any (us yet unproved) effect of constraint induced movement therapy is the result of more training.

11) Uswatte.G. et al (1998)

Reported Constraint induced movement therapy produce massive alternations in brain organization and function correlated with large improvements in motor ability that it produces.

12) Wolf et al (1997)

They suggest that force use therapy for the upper limb involves induces use of the more affected limb for a target of 90 percent of walking hours by using a sling over a period of two or three weeks

13) Lee JH, szaflarski JP et al(1990)

States that increased affected arm use during CIMT appears to induce cortical reorganization as measured by FMRI. In patients who responded to MCIMT, cortical reorganisation was positively related to degree of increase in affected arm use and ability. Because MCIMT is more easily administer than longer duration protocols. MCIMT may be more practicable way of studying plasticity.

14)Annet Kunkel et al(1990)

Concluded that constraint induced movement therapy is an efficacious treatment for chronic stroke patients, especially in term of real world outcome.

15)Johanna h. Vander lee et al(1990)

Reported that the study showed a small but lasting effect of CIMT on the dexterity of the affected arm and and temporary clinically related effect on the amount of use of the affected are during activities of daily living.

16)Bourbonnais et al(1987)

Revealed that Movement deficits in hemiparetic upper extremities may be more a problem of agonist muscle weakness than antagonist muscle spasticity.

CHAPTER – 3

MATERIALS AND METHODOLOGY

III.MATERIALS &METHODOLOGY

111. 1 MATERIALS

The following equipments were used in the study in which Constrained Induced Movement Therapy was given for the stroke patients

- Sling.
- Desk/table of standard height.
- Straight back chair.
- Table top to indicate test object placement/template to the tapped flush to the desk.
- Talcum or baby powder.
- Stop watch.
- Box (card board).
- 1-lb cuff-weight with Velcro strap.
- 1-20 lb cuff-weight with removable weight inserts.
- Unopened soft drink can.
- Pencil.
- Paper clip.
- Three standard checkers.
- Three index cards.
- Standard grip strength dynamometer.
- Lock and key.
- Standard dish towel.
- Plastic basket with handle.

METHODOLOGY

POPULATION

Patient with age group of 40-70 years having MCA stroke.

STUDY DESIGN

The design that is used for this study is the Quasi Experimental study.

- Pre and Post Experimental design.

STUDY SETTING

- Out Patient DepartmentNandha College of Physiotherapy -Erode.
- Government Head Quarters Hospital-Erode.

STUDY DURATION

- Study was conducted for a period of 9 months.

TREATMENT DURATION

- 6 hours therapy (including intervals) session per day, 5 days in week for 2 months.

STUDY SAMPLING

- Convinent sampling method.

SAMPLE SIZE

- A total of 30 MCA stroke subjects.
    - [Experimental group – 15 subjects]
    - [Control group – 15 subjects]

CRITERIA FOR SAMPLE SELECTION

INCLUSION CRITERIA

- Gender: both male and female
- Age group between 40 and 70 years.
- Minimum motor criteria at 20° extension of the affected wrist and 10° of each finger.
- Willingness to participate
- No visual perceptual, communication problem.
- No serious uncontrolled medical problems.

EXCLUSION CRITERIA

- Un co-operated patients.
- Serious sensory cognitive or aphasic deficit.
- Ability to make extensive use of involved upper extremity.
- Severe aphasia.
- Severe cognitive impairments.
- Other type of Stroke patients.

PARAMETER

- WOLF MOTOR FUNCTION TEST(WMFT).

WOLF MOTOR FUNCTION TEST

The scale was developed by **wolf et al.** it is an objective measure of functional activities. The scale consist of 17 functional tasks commonly performed in everyday life. Scoring uses a 6 point ordinal scale with ranging from 0 to 5.

The scale is evaluated by asking the patient to perform all tasks as quickly as possible and are truncated at 120 seconds. Task are as follows

- Forearm to table side.
- Forearm to box side.
- Extend elbow side.
- Extend elbow (to the side) with weight.
- Hand to table (front).
- Hand to box (front).
- Weight to box.
- Reach and retrieve (front).

- Lift can (front).
- Lift pencil (front).
- Pickup paper clip (front).
- Stack checkers (front).
- Flip cards (front).
- Grip strength (front)
- Turning the key in lock (front)
- Fold towel (front).
- Lift basket (standing).

Each task is measured by 6 point functional ability scale at 120 seconds.

GENERAL INSTRUCTION

"Today we are going to take a look at how you are able to use your arm. Let me tell you how we are going to go about this. First, I will give you instructions on how to do the task, and then I will show you how to do it. I will describe and demonstrate each task 2 times. Do not practice the task while I'm describing and demonstrating it. However, I will be happy to clarify any confusing points. Then I will say "Ready, set, go" and you will do the task."

It is important that you do not start until I say "go" otherwise, we will need to repeat the entire task. Each of the activities you will be asked to do should be carried out as rapidly as possible. You can work on each task for up to two minutes. We ask that you attempt each part of the test even if you do not think that you can do it. If you are unable to carry out a task, then we will go on to the next one. Again,try to do each task as rapidly as possible. Do you have any questions?"

INTERVENTION

The subject of both groups underwent conventional therapy for both upper and lower limb. In addition to the Experimental group subjects for underwent constraint induced movement therapy for upper limb alone.

TECHNIQUE AND APPLICATION

The subject who participated study is divided into two Groups. One is Experimental Group and other one is Control Group.

- Experimental Group underwent Constraint Induced Movement Therapy along with Conventional Therapy.
- Control Group received only Conventional Therapy.

PROCEDURE

The intervention consisted of the patient wearing a mitt onher uninvolved hand during all waking hours, except for water-basedactivities such as washing hands and toileting, for the entire2 months treatment period. The use of the mitt versus a slingor other restraint was chosen for safety of the patient andto encourage her to wear the mitt. During 10 treatment days,the patient participated in supervised task practice in an outpatientsetting, for 2 hours a day. The 2 months treatment period withsupervised activities during the weekdays was based on previouswork done by **Taub et al** and **Wolf et al**

Everyday use of the handand return to activities of daily living, including leisureinterests, were the primary focus. Initially, the patient wasasked what activities she had participated in prior to the strokeand whether she had a preference of tasks she would like topractice. These activities included grooming, writing, dressing,playing board games, gardening, computer work, and sewing. Eachtask was subdivided by the trainer into a hierarchy of componentmovements that progressed in complexity to minimize failureor frustration.

A typical day started out with practicing a task related toher activities of daily living for 45 minutes to an hour, followedby a rest break, then playing a board game for the next hour,followed by another rest break, then using the computer forapproximately 30 minutes. Lunch usually lasted an hour (includingfood preparation) and was followed by 3 more 30-minute sessionsseparated by rest breaks. During these sessions, she practicedsewing, gardening, and simple household cleaning. The patientwas also monitored during meals and asked to bring finger foodsfor lunch, such as sandwiches, precut vegetables, and fruit.She was encouraged to keep an activity log that described alltasks performed with the paretic limb while away from the rehabilitationfacility.

Each morning, the trainer reviewed the activity logwith the patient, discussing performance and use of the mittduring the previous evening. Typically, the patient would documentuse of her paretic limb in activities such as dinner (includingpreparation and cleanup) for approximately an hour, using theremote control while watching television for 2 hours, dressingand grooming for 30 minutes, and conversing on the telephone.Volunteers from the community and students completing internshiprequirements at the rehabilitation center were recruited tosupervise daily tasks. Each trainer went through 2 to 4 one-hourorientation sessions. At these times, the trainers learned aboutthe CIMT paradigm and safety procedures and how to sequencecomponents of the functional tasks selected by the patient.The trainers supervised the patient during the entire day monitoringwearing of the mitt and providing verbal encouragement.During the 2-week intervention period, the patient seemed totolerate wearing the mitt fairly well. The tasks chosen to practicewere structured in such a manner that she encountered enoughsuccess to maintain concentration and continue working. Restperiods occurred every 1 to 2 hours to prevent fatigue. AlthoughHe^{or}she were motivated to improve, the patient stated that she grewtired of wearing the mitt and had difficulty with full adherenceat home. After leaving the rehabilitation center, he or she was instructedto wear the mitt for all activities agreed on in the originalbehavior contract. Often, He/she said were so fatigued afterthe day of training that his/her activities at home were limitedto eating

dinner, watching television, and going to bed earlierthan she normally would. "Cheating" with the uninvolved handwas a frequent temptation for the patient, but He/she respondedwell to verbal encouragement and gentle reminders to use theaffected limb appropriately.

CONTROL GROUP

The subjects underwent conventional therapy are as follows

- Passive movement
- Stretching
- Strengthening exercise
- Active movement
- Resisted exercise

CHAPTER – 4

DATA PRESENTATION

AND ANALYSIS

DATA PRESENTATION AND ANALYSIS

STATISTICAL TOOLS

For the pre and post test experimental study, both paired and unpaired ‘t’ test was used for each parameter in an intra group analysis to find out the significance of improvement achieved through intervention. Then unpaired ‘t’ test was used to find out the significance of the changes between two groups i.e., inter-group analysis.

PAIRED ‘t’-TEST

To compare the effect between two groups students ‘t’ test for paired values.

Formula for paired t-test

$$S = \frac{\Sigma d^2 - \frac{(\Sigma d)^2}{n}}{n-1}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = difference between the pre testand post test

$\bar{d}$ = Mean difference

n = Total number of subjects

S = Standard deviation

UNPAIRED t- TEST

The unpaired t-test was used to compare the effects between two groups, students 't' test for unpaired values

Formula unpaired t –test

$$S = \sqrt{\frac{(n_1-1){s_1}^2+(n_2-1){s_2}^2}{n_1+n_2-2}}$$

$$t = \frac{|\bar{x}_1-\bar{x}_2|}{s\sqrt{\frac{1}{n_1}+\frac{1}{n2}}}$$

n_1 = Total number of subjects in Experimental Group

n_2 = Total number of subjects in Control Group

$\overline{X_1}$ = Mean difference between pretestand post test of Experimental group.

$\bar{X}_2$ = Mean difference between pre testand post test of Control Group .

S_1 = Difference between pre testandpost test of Experimental Group .

S_2 = Difference between pre testandpost test of Control Group .

TABLE 4.1

MEAN DIFFERENCE VALUE OF EXPERIMENTAL GROUP AND CONTROL GROUP.(WOLF MOTOR FUNCTION TEST)

GROUPS	MEAN DIFFERENCE
EXPERIMENTAL GROUP	5.8
CONTROL GROUP	3.3

FIGURE 4.1

GRAPHICAL REPRESENTATION OF MEAN DIFFERENCE VALUE OF EXPERIMENTAL GROUP AND CONTROL GROUP.(WOLF MOTOR FUNCTION TEST)

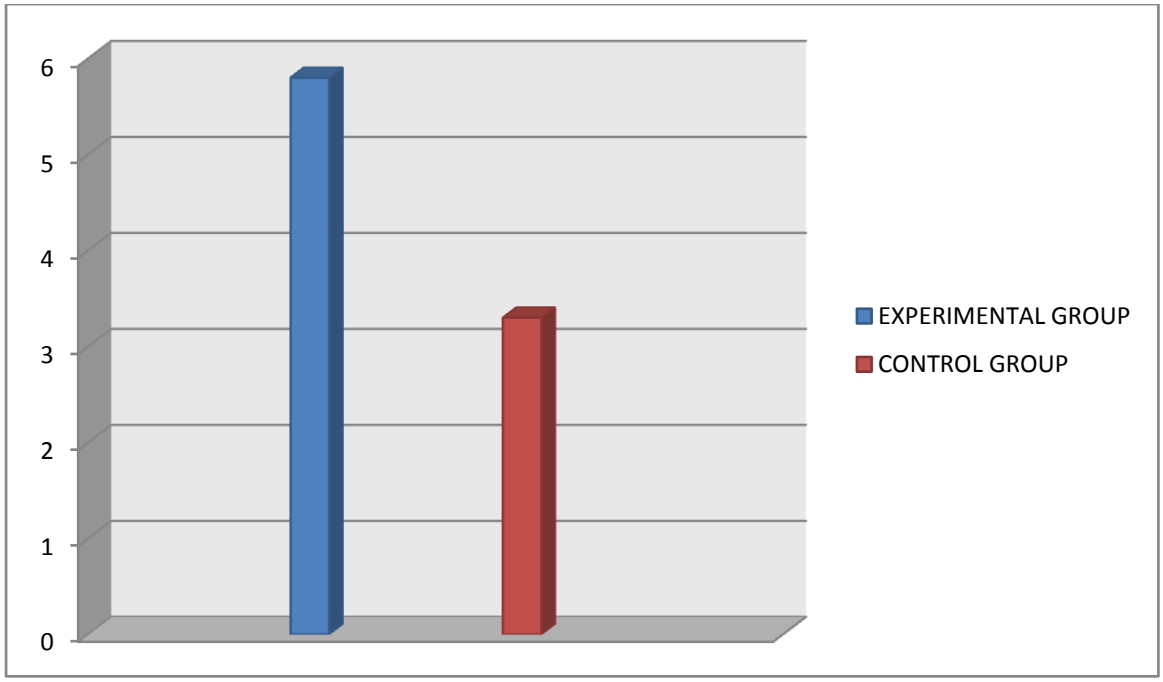


TABLE4. 2

STANDARD DEVIATION VALUES OF EXPERIMENTAL AND CONTROL GROUP .(WOLF MOTOR FUNCTION TEST)

GROUPS	STANDARD DEVIATION
EXPERIMENTAL GROUP	1.20
CONTROL GROUP	1.03

FIGURE4. 2

GRAPHICAL REPRESENTATION OF COMPARISON OF STANDARD DEVIATION VALUES OF EXPERIMENTAL GROUP AND CONTROL GROUP.(WOLF MOTOR FUNCTION TEST)

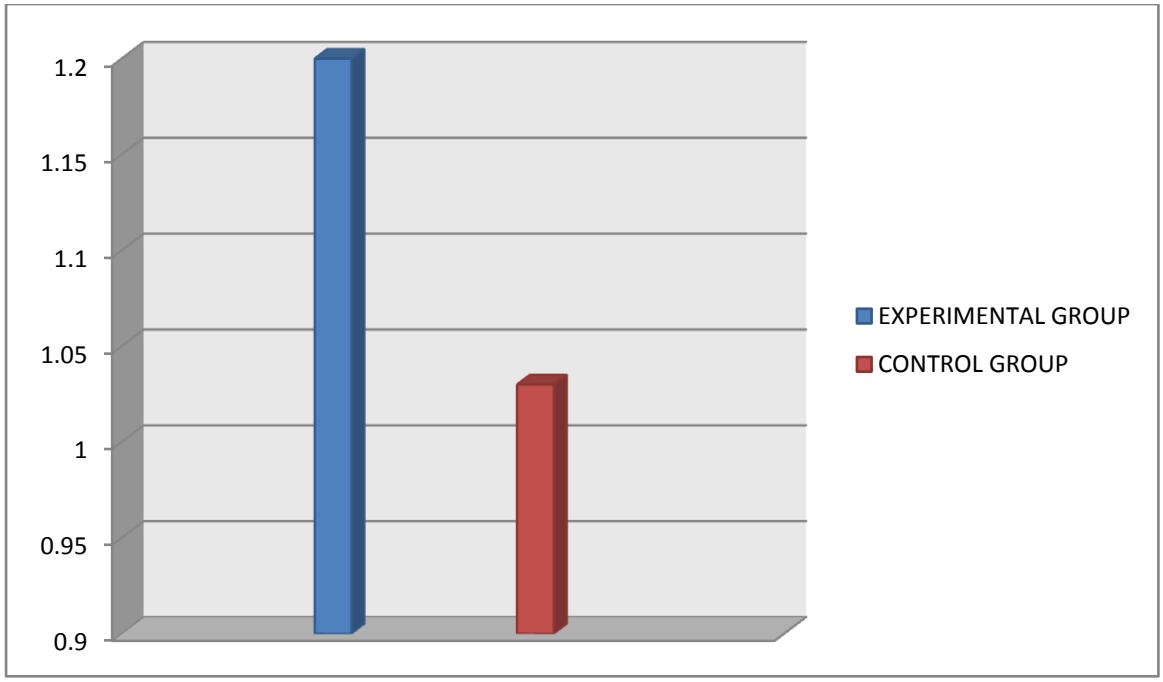


TABLE4. 3

PAIRED 't' TEST VALUE OF EXPERIMENTAL GROUP AND CONTROL GROUP.(WOLF MOTOR FUNCTION TEST)

GROUPS	CALCULATED PAIRED 't' VALUES	TABLE VALUE	SIGNIFICANCE
EXPERIMENTAL GROUP	18.70	2.15	SIGNIFICANT
CONTROL GROUP	12.38	2.15	SIGNIFICANT

FIGURE 4.3

GRAPHICAL REPRESENTATION OF PAIRED 't' TEST VALUES OF EXPERIMENTAL GROUP AND CONTROL GROUP.(WOLF MOTOR FUNCTION TEST)

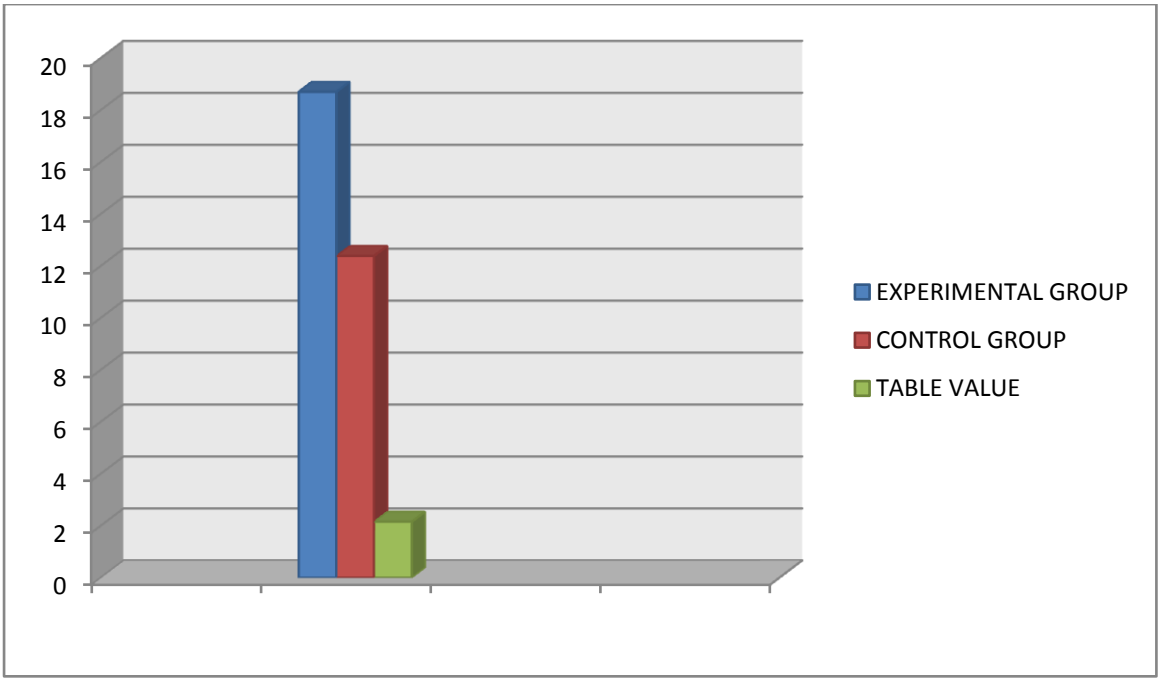


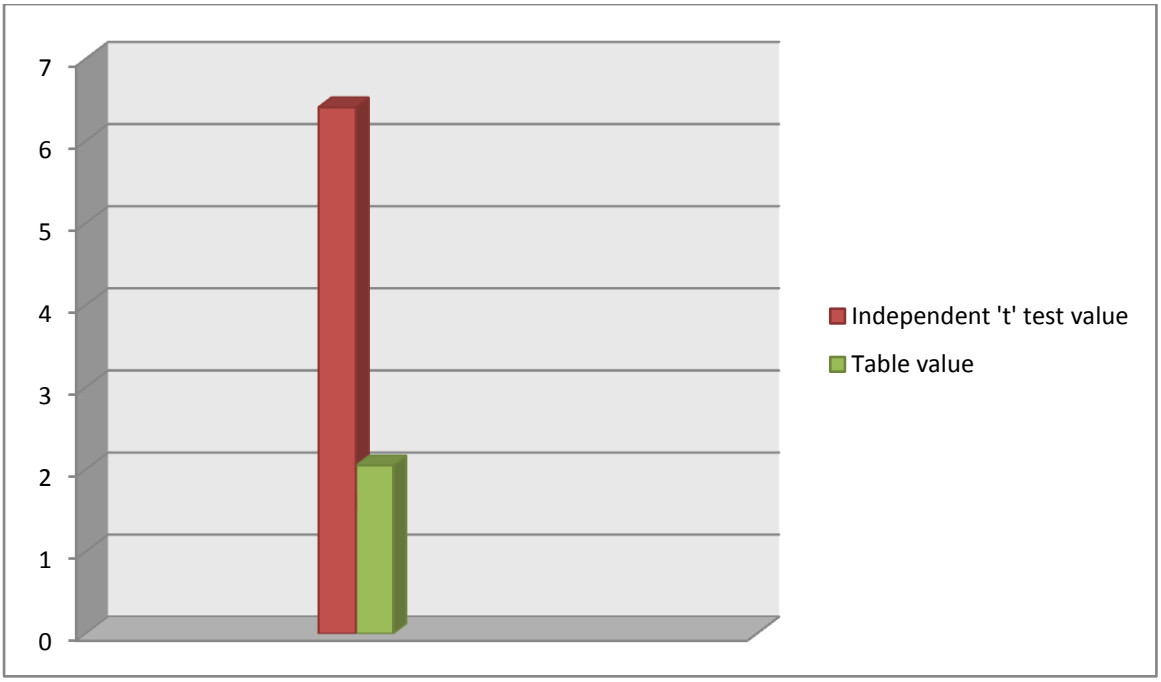
TABLE 4.4

UNPAIRED 't' TEST VALUE OF EXPERIMENTAL GROUP AND CONTROL GROUP.(WOLF MOTOR FUNCTION TEST)

GROUPS	CALCULATED UNPAIRED 't' VALUES	TABLE VALUE	SIGNIFICANCE
COMPARISON OF EXPERIMENTAL GROUP AND CONTROL GROUP	6.41	2.05	SIGNIFICANT

FIGURE 4.4

GRAPHICAL REPRESENTATION OF UNPAIRED 't' TEST VALUE OF EXPERIMENTAL GROUP AND CONTROL GROUP.(WOLF MOTOR FUNCTION TEST)



CHAPTER – 5

RESULTS AND DISCUSSION

V. RESULTS AND DISCUSSION

V.1 RESULTS

The study sample comprised 30 patients, of which 15 were Experimental Group and 15 were Control Group.All the subjects underwent neurological assessment perfoma. The median time interval applied between before and after therapy was 4 weeks. Among 30 subjects, 15 were treated with Constraint Induced Movement Therapy, and 15 were treated with Conventional Therapy alone.

The pre and post test values were assessed by **WOLF** motor function test in Experimental Group. The mean difference value is 5.8. The standard deviation value is 1.20. The paired ' t ' test value is 18.70.The paired ' t ' test value is more than table value 2.15 for 5% level of significance at 14 degree of freedom.

The pre and post test values were assessed by**WOLF** motor function test in Control Group. The mean difference value is 3.3. The standard deviation

value is 1.03. The paired ' t ' test value is 12.38. The paired ' t ' test value is more than table value 2.15 for 5% level of significance at 14 degree of freedom.

The calculated ' t ' values by unpaire d ' t ' test were 6.41. The calculated ' t ' values were more than the table value 2.05 for 5% level of significance at 28 degree of freedom.

The paired ' t ' test values have shows that Constraint Induced Movement Therapy program were more effective than Conventional Therapy for patients with MCA stroke. The unpaired ' t ' test values have shown that there was significant difference between two groups in showing improvement in their quality of life in patients with stroke.

DISCUSSION

While consideration of improving functional abilities after stroke I found there was a effective and good improvement in stroke patients.

According to **Edward Taub et al** improvements in motor skills and the use of the affected arm and hand in daily activities after Constraint Induced Movement Therapy.

According to**AlexnderW.Dromerick et al** Constraint Induced Movement Therapy is an appropriate method to improve sensorymotor recovery after stroke. CIMT discourages the use of unaffected upper extremity and encourage the use of the hemiplegic arm.

According to **David M. Morriset al** these CIMT has significantly improved the quality of movement and substainly increased amount of use of a more affected upper extremity in the activities of daily living in life situation.

The final stage of my thesis work found that constraint Induced Movement Therapy not only improves the functional abilities and also to reverse the learned non use for stroke patient.

This study has proved that Constraint Induced Movement Therapy is more effective than Conventional Therapy for MCA stroke.

LIMITATIONS

- This study has been conducted on small sized sample only.
- This study has taken more time to complete.
- Variation in calamite, drugs, diet, personal habit, side of involvement, gender, age could not be controlled.

RECOMMENDATIONS

- A similar study may be extended with larger samples.
- A constrained induced movement therapy may be applied to the other conditions like cerebral palsy, traumatic brain injury, spinal cord injury.
- A similar study may be extended to conservatively treated patients.

CHAPTER -6

SUMMARY ANDCONCLUSION

SUMMARY AND CONCLUSION

From the result of this study through conventional therapy shows improvement for the recovery of the functional abilities after stroke, Constraint Induced Movement Therapy has more advantages over Conventional Therapy, in terms of reverse the learned non use and functional abilities. Clinically it is important after stroke to regain the sufficient functional abilities.

Based on 't' values, it could be seen there is significant difference between the calculated values and table values. The mean and standard deviation between these groups shows greater from Constraint Induced Movement Therapy than Conventional Therapy.

Through the results, **NULL HYPOTHESIS IS REJECTED AND ALTERNATE HYPOTHESIS IS ACCEPTED** and also the study could be concluded that **THERE IS A SIGNIFICANT DIFFERENCE BETWEEN CONSTRAINT INDUCED MOVEMENT THERAPY AND**

CONVENTIONAL THERAPY FOR THE IMPROVEMENT OF FUNCTIONAL ACTIVITIES AFTER STROKE.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. **Berta bobath**, Adult Hemiplegia : Evaluation and treatment, 3rd edition,1998, Butterworth-Heinemann, pp: 70-160

2. **Chrispopherhaslett, Edwin R. Chilvers, John A.A.** Hunter and Nicholas A. Boon, Davidson's Principles and Practice of Medicine, 18th edition , 1999, Churchill Livingstone, pp. 974-977

3. **Darcy A Umphred** Neurological Rehabilitation, 4th Edition, Mosby, pp. 751-781

4. **Derrick t wade**, measurement in neurological Rehabilitation, Reprinted-1992, Oxford University Press,pp.172,173

5. **Edwin R Bickerstaff and John A Spillane**, Neurological Examination in clinical Practice, reprinted-1992, Oxford University Press, pp:153-204

6. **Elizabeth Domholdt**, Physical Therapy Research: Principles and Applications, Reprinted-1993, W.B Saunders company, pp:133,153-160

7. **Geraint Fuller**, Neurological Examination made easy, Reprinted 2000, Churchill Livingstone, pp: 9-17

8. **J.C Grotta, E.A Noser, T. Ro, C.Boake, H. Levin, J. Aronowski, and t. Schallert.** Constraint Induced Movement Therapy. Stroke. 2004 ;35(11-supply-1)2699

9. **J.M Todd and P.M. Davies**, Cash's text book of neurology for physiotherapists, edition, 1993, Jaypee Brother's pp, 267-295

10. **Janet H car and Roberta B Shepherd,** A Motor Relearning Programme for stroke, edition, 1997, Butter worth and Heinemann, pp: 43-73

11. **Janet H car and Roberta B Shepherd,** neurological Rehabilitation, Reprinted-2000, Butter Worth and Heinemann, pp: 145,253

12. **Kopp B, Kunkel A, Flor H, Platz T, Rose U, Mauritz K-H, et al**. The Arm Motor Ability Test (AMAT): reliability, validity, and sensitivity to change of an instrument for assessing ADL disability. Arch Phys Med Rehabil 1997; 78: 615-620.

13. **Kunkel A, Kopp B, Muller G, Villinger K, Villringer A, Taub E, et al.** Constraint Induced movement Therapy: a powerful new technique to induce motor recovery in chronic stroke patients. Arch Phys Med Rehabil 1999; 80: 624-628.

14. **McCulloch k, Cook EW, III., Fleming WC, Novack TA, Nepomeceno CS, Taub E.** A reliable test of upper extremity ADL function[abstract]. Arch Phys Med Rehabil 1998; 69: 755.

15. **Miltner WHR, Bauder H, Sommer M, Dettmers C, Taub E.** Effects of Constraint Induced Movement Therapy on chronic stroke patients: a replication. Stroke 1999; 30: 586-592.

16. **P.S.S. Sunder Rao and J. Richard**, Introduction to Biostatistics, 3rd edition, 2011, Prentice Hall of india, pp.77-80

17. **Patricia M davies**, Steps To Follow, 10th printing, 1994, Springer-Verlang, Berlin Heidelberg, pp, 120-145

18. **Raymond D Adams and Maurice Victor,** Principles of Neurology, 5th Edition, 1992, Little Brown and company, pp:669-674, 681-682

19. **Richard S Snell**, Clinical Neuro Anatomy for Medical Students,3rd Edition 1992

20. **S.L.Fritz, K.E Light, S.N Clifford, T.S.Patterson, A.L Behrman, and S.B Davis.** Descriptive characteristics as potential predictors of outcomes following Constraint Induced Movement Therapy for people after stroke. Physical Therapy, 2006; 86: 825-832.

21. **Susan B.O' Sollivan and Thomas J Schmitz**, Physical Rehabilitation: Assessment and Treatment,4th edition, Jaypee Brothers,2001 pp:520-524,575-576

22. **Taub E, Crago JE, Uswatte G.** Constraint-Induced Movement Therapy treatment in physical rehabilitation. RehabilPsychol 1998; 43: 152-170.

23. **Taub E, Miller NE, Novack TA, Cook EW, III., Fleming WC, Nepomuceno CS, et al.** Technique to improve chronic motor deficit after stroke. Arch Phys Med Rehabil 1993; 74: 347 – 354.

24. **Van Der Lee JH, Wagenaar RC, Lankhorst GJ, Vogelaar TW, Deville WL, Bouter LM.** Forced use therpy of Upper Extremity in chronic stroke patients. Stroke. 1990; 30:2369-2375.

25. **Wolf SL, Lecraw DE, Barton LA, Jann BB.** Forced use of hemiplegic upper extremities to reverse the effect of learned nonuse among chronic stroke and head-injured patients. ExpNeurol 1989; 104: 125-132.

APPENDICES

APPENDICES

APPENDIX-1

Task Instructions

1. **Two tasks (1A. & 1B. – Tasks 1 & 2). Functional ability of the involved upper extremity;tasks performed to the side of the patient (i.e., away from the midsagittal plane of the patient). Shoulder movement of abduction.**

1A. (1). Forearm to table (side)

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair Position (side) • Hips against back of chair. • Hands in lap. • Both feet on floor. • Filming position (Side).	Task Description: Patient attempts to place forearm on the table (adjacent and parallel to front edge) by abduction at the shoulder. (some shoulder flexion will probably also necessary to get arm past the edge of the table). "Forearm" is defined as the wrist and elbow. The palmar surface of the hand need not be flat. Timing ends when both the forearm and hand touch the table. **Timing Procedure:** Starts on word "Go" and ends when patient's forearm and hand both touch the table in the required position. **Measure:** The time elapsed from the starting point to the moment the forearm and hand touch the table in the required fashion.	Verbal Instructions: • "Place your forearm on the table as quickly as you can. Do it just like this (examiner demonstrates). At the end of the movement, your forearm and hand should be touching the surface of the table. Do this as quickly as you can". (repeat instructions) • "Do you have any questions?" • "Ready, set, go." **Scoring:** • FA scoring should take into account the extent to which the head and trunkare maintained in normal alignment and the speed, fluidity, and precision with which movements are performed.

1B(2) Forearm to box side

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair Position (side). • Hips against back of chair. • Hand not being tested in lap. • Shoulder of tested arm abducted with the forearm pronated and placed flat on table with radial edge adjacent to front edge of table; elbow at line 14cm. From side edge of template. Palmar surface of hand need not to be flat. If final position of arm on previous task (1A) is not 14cm. From side edge of table, move subject's arm into correct position before beginning this task. • Place a box of appropriate height (see comment # 16) in the template area located 13.5cm. from the midline. Box should be stabilized by someone during the trial. • Filming Position (Side)	Task Description: Patient attempts to place forearm (from wrist to elbow) on the box by further abduction at the shoulder. (Again some shoulder flexion may be necessary to clear edge of box.) At the end, the forearm should be flat on the box with the hand drooping over side edge of box. The wrist must be beyond the line 2cm. From the front edge of box and the elbow must be beyond the front edge of the box. **Timing procedure:** Starts on word "Go" and ends when patient's forearm and elbow are flat on the box, wrist is beyond 2cm. Line and the hand is beyond the end of the box in a relaxed position. **Measure:** The time elapsed from starting point to the moment the forearm touches the top of the box in the required fashion with the hand drooping over the edge of the box.	Verbal Instructions: • "Place your forearm on the box as quickly as you can. Do it just like this (demonstrate). At the end, your whole forearm should be flat and touching the surface of the box and your hand drooping over the edge of the box. Your wrist is beyond this line and your elbow must be completely on the surface of the box. Do this as quickly as you can." (repeat instructions) • "Do you have any questions?" • "Ready, set, go." **Scoring:** • FA scoring should take into account the extent to which the head and trunk are maintained in normal alignment and the speed, fluidity, and precition with which movements are performed.

2.Two tasks (2A & 2B. – tasks 3&4). Functional ability of the elbow of the involved upper extremity; movements performed to the side of the patient (i.e., away from the midsagittal

plane). Elbow movements of extension. (A small amound of external rotation at shoulder is a necessary component of these two tasks, but elbow extention is the primary component.)

2A (3). Extend elbow (to the side)

SET UP	**TASK**	**VERBAL INSTRUCTIONS**
Starting Position: • Chair Position (side) • Hips against back of chair. • Hands in lap. • Both feet on floor. • Filming position (Side).	Task Description: Patient attempts to place forearm on the table (adjacent and parallel to front edge) by abduction at the shoulder. (some shoulder flexion will probably also necessary to get arm past the edge of the table). "Forearm" is defined as the wrist and elbow. The palmar surface of the hand need not be flat. Timing ends when both the forearm and hand touch the table. **Timing Procedure:** Starts on word "Go" and ends when patient's forearm and hand both touch the table in the required position. **Measure:** The time elapsed from the starting point to the moment the forearm and hand touch the table in the required fashion.	Verbal Instructions: • "Place your forearm on the table as quickly as you can. Do it just like this (examiner demonstrates). At the end of the movement, your forearm and hand should be touching the surface of the table. Do this as quickly as you can". (repeat instructions) • "Do you have any questions?" • "Ready, set, go." **Scoring:** • FA scoring should take into account the extent to which the head and trunkare maintained in normal alignment and the speed, fluidity, and precision with which movements are performed.

2B (4). Extend elbow (to the side) – with weight

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair Position (Side). • Hips against back of chair • Hand not being tested in lap. • Shoulder of tested arm abducted with forearm resting flat on table in pronated position exactly as in last task. • Forearm of arm to be tested adjacent to front edge of table; elbow at line 14cm. From side edge of template; palmar surface of hand need not be flat. • 1 lb weight placed at ulnar edge of wrist; distal end of the weight is aligned with ulnar styloid process (i.e., the weigt is only touching the forearm). • Filming Position (Side).	Task Description: Patient attempts to push the weight across 40cm. Line by extending the elbow and (to a lesser extent) externally rotating shoulder. Elbow should be kept on the table throughout the task (different from the previous task), and shoulders should be kept level to prevent leaning with the trunk. Again, the examiner needs to be aware of patient's trunk leaning and /or excessive external rotational at the shoulder to perform task (especially true for taller men). Note: the weight is to remain in contact with the forearm throughout the task. Repeate the task if the subject swats the weight. **Timing Procedure:** Starts on the word "Go" and ends when any part of the weight crosses line. **Measure:** The time elapsed from the starting point to the time the leading edge of the weight crosses line.	Verbal Instructions: • "Push the weight across the line (point to 40cm. Line) by moving your hand away from your body while trying to keep your elbow on the table . your forearm should remain in contact with the weight until the weight crosses the line. Also, agan, please keep your shoulders level and just like this (demonstrate). Do not lean over; keep your body straight. Do this as quickly as you can." (repeate instructions) • "Do you have any questions?" • "Ready, set, go." **Scoring:** • FA scoring should take into account: 1) the extent to which the head and trunk are maintained in normal alignment, 2) whether the forearm remains in contact with the weight, and 3) the speed fluidity, and precision with which movements are performed. • Some shoulder abduction is necessary, but inadequate or excessive motions of this type should be noted. • If the forearm doesn't remain in contact with the weight, a maximum score of 3 shoulder be assigned. • If accomplished with excessive compensatory trunk movement and /or very limited elbow extension, a maximum score of 2 shoud be assigned.

3. <u>Three Tasks (3a.,3b. & 3c., - Tasks 5,6,&7).</u> Functional ability of the shoulder of the involved upper extremity; performed to the front of the patient.

<u>3A(5). Hand to table (front)</u>

SET UP	TASK	**VERBAL INSTRUCTIONS**
<u>Starting Position:</u> • Chair Position (front). • Both hands in lap. • Hips against back of the chair. • Patient positioned so that leaning is not necessary to comfortably reach the table. • Filming position (Side).	<u>Task Description:</u> Patient attempts to place hand being tested on the table. The heel of the hand must rest beyond the line 2cm. From front edge of table. The palmar surface of the hand need not be flat. (The subject should place most of the hand in a circle.) **<u>Timing Procedure:</u>** Starts on the word "Go" and ends when the heel of the hand and fingers touch table beyond the taped 2cm. Line. **<u>Measure:</u>** The time elapsed from starting point to moment the heel of the hand and fingers touch table beyond the taped 2cm. Line.	<u>Verbal Instructions:</u> • "Place your hand on the table so that the heel of your hand is beyond the 2cm. Line. Most of your hand should be placed in the circle(demonstrate). Your hand does not need to be flat. Do this as quickly as you can."(repeate instructions) • "Do you have any questions?" • "Ready, set, go." **<u>Scoring:</u>** • FA scoring should take into account the extent to which the head and trunk are maintained in normal alignment and the speed, fluidity, and precision with which movements are performed. • **Note:** The final posture of the hand and fingers does not influence scoring as long as the heel of the hand is in contact with the table.

3B(6). Hand to box (front)

SET UP	**TASK**	**VERBAL INSTRUCTIONS**
Starting Position: • Chair Position (front). • Hips against back of chair. • Hand not being tested in lap. • Hand to be tested placed on table, heel of hand just beyond the line 2cm. From front edge of table (i.e., just past line, in circle – as in final position on last task). • Box centered on table; front edge aligned with 20cm. Line. Box should be stabilized by someone during the trial. • Filming Position (Side).	Task Description: Patient attempts to place hand on the box. The heel of the hand must be placed past the front edge of box. The palmar surface of the hand need not be flat. **Timing procedure:** Starts on the word "Go" and ends when the heel of the hand and fingers touch the box past the front edge of box. **Measure:** The time elapsed from starting point to moment the heel of hand and fingers touch box past the edge of the box.	Verbal Instructions: • "Lift your hand from the table and place it on the box so that the heel of your hand goes past the edge of the box (demonstrate). Do this as quickly as you can." (repeate instructions) • "Do you have any questions?" • "Ready, set, go." **Scoring:** • FA scoring should take into account the extent to which the head and trunk are maintained in normal alignment and the speed, fluidity, and precision with which movements are performed. • **Note**: The final posture of the hand and fingers does not interfere with scoring as long as the heel of the hand is in contact with the box.

3C (7). Weight to box.

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair position (Front). • Hips against back of chair. • Hands not be tested in lap. • Heel of hand to be tested placed on the table just beyond 2cm. taped line. • Cuff weight(s) in place around forearm to be tested; stacking of weights begun just distal to the elbow. The weights should be stacked while arm to be tested is resting on the table to avoid fatigueing the arm. • Cuff weights with 1-lb. inserts are preferable. • Box centered on table; front edge aligned with 20cm. line. Box should be stabilized by someone during the trial. • Not Filmed.	Task Description: Patient attempts to place the(weighted) hand being tested on the box so that the heel of hand rests beyond the front edge of box. Patient should not be permitted to lean in and use their body to help lift the weight; their entire back should remain in contact with the chair (scapular protraction of the moving UE is allowed). Tester may, place their finger behind the subject's back moves away from the chair. In stacking the weights near wrist, be sure to leave enough room for weights to clear the table. **Timing procedure:** Not applicable. **Measure:** Amount of weight patient is able to lift to the box while keeping their back against the chair (not timed as previous tasks). Weight amounts in the order attempted should be recorded so that the pre-treatment order can be duplicated post treatment. The maximum amount of weight lifted should be circled.	Verbal Instructions: • "Place your hand on the box so that the heel of your hand is beyond the front edge of the box (demonstrate). Keep your back against the chair. That is very important. Take your time. You do not need to hurry." (repeat instructions) • "do you have any questions?" • "Ready,set,go." **Special considerations:** • For the initial trial,. The examiner should subjectively determine the appropriate starting weight by resisting the patient's attempt to hold the elbow extended, shoulder flexed to 90°. The stronger the patient appears, the higher the initial weight shoul be. If patient is weak, task should begin with lower initial weight. Increases in the amound of 2 lbs. Should continue until the patint's maximum or 20 lbs. Is reached. When the patient has reach his/her apparent maximum, the next trial should be one 1b. Less. If that weight can be lifted, it is recorded as the maximum. A 2minute rest period should be allowed after every three trials. • Repeat the same sequence of weights for each subsequent testing session to keep the effects of fatigue consistent across assessments. • Tester may place their finger behind the patient's back at the top of the chair to determine if the subject's back leaves the chair.

4. One Task (4A. – Task 8). Functional ability of the elbow of the involved upper extremity; performed to the front of the patient.

4 8). Reach and retrieve

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair Position (Front-Close). • Hips against back of chair. • Re-powder table if needed. • 1 lb. weight centered on table and positioned just beyond 40cm.line. • Hand not being tested in lap. • Elbow of arm to be tested extended, forearm in mid-position of pronation and supination and palm of hand in contact with weight. • The subject must be able to maintain the starting position while the tester states "ready,set, go." • Filming Position (Side).	Task Description: Patient attempts to pull 1 lb. weight across the 8cm. line. Task object is a cuff weight folded so that it is approximately 7.6cm. (3") on each side, and kept in place by a Velcro fastener. **Timing procedure:** Starts on the word "Go" and ends when any part of the weight crosses the 8cm. line. **Measure:** The amout of time elapsed from the starting point to the moment the leading edge of the weight crosses the 8cm. line.	Verbal Instructions: • "slide the weight across the table toward you until it is past the line nearest you. Do the task entirely by bending your elbow (demonstrate). The weight should remain in contact with your hand until it crosses the line. Do this as quickly as you can." (repeat instructions) • "Do you have any questions?" • "Ready, set, go." **Scoring:** • FA scoring should take into account: 1) the extent to which the head and trunk are maintained in normal alignment, 2) whether the activity is performed by bending the elbow as opposed to using excessive upper arm or hand movements (i.e., swatting the weight with the hand), and 3) the speed, fluidity, and precision with which movements are performed. • If the patient's forearm loses contact with the weight or pronates, a maximum FA score of 3 should be assigned. • If the patient is unable to maintain the starting position without physical assistance, a zero is assigned and activity is not attempted.

5) Nine tasks (5A-1-Tasks 9-17). Functional ability of the arm and hand of the involved upper

extremity; performed to the front of the patient.

5A(9). Lift can

SET UP	**TASK**	**VERBAL INSTRUCTIONS**
Starting Position: • Chair Position (Front). • Hips against back of chair. • Hands in lap. • Unopened 12-oz. Soft drink can (392 gm) placed on table at patient's midline with front edge of can just beyond 20cm. line. • Filming Position (Side close).	Task Description: Patient attempts to lift the can and bring it close to lips with a cylindrical grasp is not allowed for this task. Note – If the patient performs the task by lifting the can using an overhead grasp, repeate the task one more time. Assign a 129+ if the task cannot be accomplished in the correct manner. **Timing procedure:** Starts on the word "Go" and ends when can is within approximately one inch of patient's mouth. **Measure:** The time elapsed from starting point to the moment the can comes within approximately one inch of patient's mouth.	Verbal Instructions: • "Lift the can to your mouth without touching your lips, like this (demonstrate). It is important that you are the appropriate grasp and an overhand grasp is not allowed (demonstrate both grasps). Do this as quickly as you can." (repeate instructions) • "Do you have any questions?" • "ready, set, go." **Scoring:** • FA scoring should take into account: 1) the extent to which the head and trunk are maintained in normal alignment, 2) whether the appropriate grasp is used (cylindrical grasp), 3) the directness of the trajectory to the mouth, and 4) precision with which movements are performed.

B(10). Lift pencil

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair Position (Front). • Hips against back of chair. • Hands in lap. • 7" pencil (with 6 flat sides) placed parallel to front edge of table, centered on patient's midline and with front edge of pencil at 20cm. line. • Filming Position (side-Close).	Task Description: Patient attempts to pick up the pencil using 3-jaw chuck grasp (thumb and first two fingers). The pencil should be picked up on the table and not over the edge of the table. Note – if the patient performs the task by lifting the pencil over the edge of the table once, repeate the task one more time. Assign a 120+ if the task cannot be accomplished in the correct manner. **Timing Procedure:** Starts on the word "Go" and ends when entire pencil (all surfaces) is raised from table at least half inch. **Mesure:** The ctime elapsed from the starting point to the moment the entire pencil is raised from the table.	Verbal Instructions: • "Pick up the pencil using your thumb and first two fingers and hold it in the air like this (demonstrate). The pencil should be picked up on the table and not over the edge of the table. Do this as quickly as possible." (repeate instructions) • "Do you have any questions?" • "Ready, set, go." **Scoring:** • FA scoring should take into account: 1) the extent to which the head and trunk are maintained in normal alignment, 2) whether the appropriate grasp is used (3-jaw chuck grasp), and 3) the speed, fluidity, and precision with which movements are performed. • A 3-jaw chunck grasp should be used. If another grasp is used, a maximum FA score of 2 should be assigned. • Raters should take into account the patient's control of the grasp. If the patient immediately drops the pencil, a maximum FA score of 3 should be assigned.

5C(11). Lift paper clip

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair Position (front). • Hips against back of chair. • Hands in lap • 2" paper clip (coated and colored) placed parallel to the edge of table, centered on patient's midline, and with front edge of clip at 20cm. line; the wider end of the paper clip should be facing towards the side to be tested. • Filming Position (Side-Close)	Task Description: Patient attempts to pick up the paper clip using a pincer grasp (pads of thumb and index finger opposed). The paper clip should be picked up on the table and not over the edge of the table. Note- If the patient performs the task by lifting the paper clip over the edge of the table once, repeate the task one more time. Assign a 120+ if the task cannot be accomplished in the correct manner. **Timing Procedure:** Stars on the word "Go" and ends when entire paper clip is off the table at least half inch. **Measure:** The time elapsed from the starting point to the moment the entire paper clip is raised from the table.	Verbal Instructions: • "Pick up the paper clip using your thumb and index finger and hold it in the air like this (demonstrate). The paper clip should be picked up on the table and not over the edge of the table. Do this as quickly as possible." (repeat instructions) • "Do you have any questions?" • "Ready, set, go." **Special consideration:** • Fingernail length can significantly affect performance; therefore, patient should be instructed during the phone call making test arrangements to not clip fingernails for at least three days before test session. **Scoring:** • FA scoring should take into account: 1) the extent to which the head and trunk are maintained in normal alignment, 2) whether the appropriate grasp is used (pincer grasp), and 3) the speed, fluidity, and precision with which movements are performed. • A pincer grasp should be used. If another grasp is used, a maximum FA score 2 should be assigned. • Raters should take into account the patient's control of the grasp. If the patient immediately drops the pencil, a maximum FA score of 3 should be assigned.

5D(12). Stack checkers

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair position (front). • Hips against back of chair. • Hands in lap. • Three checkers are placed in a line parallel to front edge of table with front edge of each checker just beyond 20cm. line. Checkers are spaced 4.5cm. apart with middle checker at patient's midline. • Filming Position (Side-close).	Task Description: Patient attempts to stack the two end checkers onto the centrecheker. The task can be executed by picking up either checker first. **Timing Procedure:** Starts on the word "Go" and ends when patient has placed the third checker in required position. **Measure:** The time elapsed from the starting point to the moment the third checker is in place.	Verbal Instructions: • "Stack the two end checkers onto the centerchecker.The checkers do not have to be perfectly stacked, but the top two checkers must not touch the table surface (demonstrate – not special consideration). Do this as you can." (repeat instructions) • "Do you have any questions?" • "Ready, set, go." **Special Considerations:** • Checkers may be out of alignment, but in order for the task to be considered completed, the top two checkers may not be touching the table surface. The tester should demonstrate what is not acceptable. **Scoring:** • FA scoring should take into account the extent which the head and trunk are maintained in normal alignment and the speed, fluidity, and precision with which movemwnts are performed. • The checkers do not need to be perfectly aligned; therefore, do not deduct rating points based on alignment of checkers.

5E(13). Flip cards

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair position (front). • Hips against back of chair. • Hands in lap. • Tree 3"x5" index cards placed in a line parallel to front edge of table, with short (3") far edge of card facing patient just beyond 20cm. line. Cards spaced 3cm. apart with middle card at patient's midline. • Filming position (Side-close).	Task Description: Using a pincer grasp on the near edge of cards, patient attempts to flip each of the cards over. This task should be done by sliding the front edge of the card just past the front edge of the table with some or all of the fingers and then grasping the card edge protruding past the table edge between the palmar surfaces of thumb and index finger. Cards should be flipped over from side to side (rather than from front to end). The cards do not have to be straightened or adjusted after they have been turned over. The patient should first flip over the card, and then the card on the opposite side. Patient should be prevented from wetting fingers by licking (which they commonly try to do). **Timing Procedure:** Starts on the word "Go" and ends when patient has flipped all cards into a new position. **Measure:** The time elapsed from the starting point to the moment the third card has been flipped over and released onto the table.	Verbal Instructions: • "Flip each of the cards over. You should slide the card toward you so that it goes a little over the edge of the table. Start with the card on your (state side being tested) side, then the center card, and then the card on your (state opposite side) side. The cards should be flipped over from side to side rather than from end to end (demonstrate both correct and incorrect methods). The cards may land anywhere on the table, so you do not need to straighten the cards after turning them over. Do not lick your fingers and do the task as quickly as you can." (repeat instructions) • "Do you have any questions?" • "Ready, set, go." **Scoring:** • FA scoring should take into account: 1) the extent to which the head and trunk are maintained in normal alignment, 2) whether the forearm supinates when turning the cards, 3) the dexterity of the fingers, and 4) the speed, fluidity, and precision with which movements are performed. • If the patient makes more than 2 attempts on any card, a maximum FA score of 2 should be assigned. • If the patient fails to flip all cards side to side, a maximum FA score of 3 should be assigned.

5F(14). Grip strength

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair Position (Front-Close). • Hand not to be tested on thigh. • Hips against back of the chair. • Upper extremity to be tested placed on table, olecranon process at front edge of table, forearm in neutral position, elbow flexed, shouder slightly flexed and in 0° abduction. • The hand-held dynamometer is set on the second setting position. • Grip strength dynamometer placed in hand that is resting on the table. The tester or an assistant should stabilize the dynamometer for the patient from the front of the patient. • Not Filmed.	Task Description: Patient attempts to grip the dynamometer with greatest grip strength possible. The test should be conducted 3 times with a 1-munute rest between trials. **Timing Procedure:** Not applicable. **Measure:** The mean of grip strength exerted (kg) on 3 trials.	Verbal Instructions: • "Squeeze the handle down as far as you can for atleast 5 seconds and then let go when i say "Release." I will ask you to do this 3 times with a 1-minute rest between attemps." (repeat instructions) • "Do you have any questions?" • "Ready, set, go."

5G(15). Turning key in lock

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair Position (Front). • Hands placed on thighs. • Hip against back of chair. • Lock and key board is stabilized at a 45 degree angle, preventing board from moving when used by patient; board held parallel to front edge of table, just beyond 8cm. line and centered on patient's midline. • Filming Position (Side-Close).	Task Description: Using a lateral pincer grasp, patient attempts to move the key in the lock from the vertical position first to the side being tested, then to the opposite side and finally back to the vertical starting position. Tumblers of the lock are set so that the key moves throught a 180° arc (only), with 90 degrees of that arc on either side of the midline. **Timing Procedure:** Start on the word "Go". End when the key is in the starting position again. **Measure:** The time elapsed from the starting point to the moment the key is returned to the starting position.	Verbal Instructions: • "Grasp the key between your thumb and your forefinger (demonstrate) and turn the key, first to the (state the opposite side) as far as the key will turn and finally return the key to the original vertical position. There is a stop on either side. Be sure you move the key until you reach this point. Do this as quickly as can." (repeat instructions) • "Do you have any questions?" • "Ready, set, Go." **Scoring:** • FA scoring should take into account: 1) the extent to which the head and trunk are maintained normal alignment, 2) whether the appropriate grasp is used (a lateral pincher grip), 3) whether the forearm moves into pronation and supination as the key is turned, and 4) the speed, fluidity, and precision with which movements are performed. • If the patient doesn't turn the key in correct sequence (i.e., turn the key to side being tested first), a maximum of 3 should be assigned for FA score. • If a grasp other than a lateral pincer grasp is used, a maximum FA score of 3 should be assigned.

5H(16). Fold towel

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Chair Position (Front). • Hands placed on thighs. • Hips against back of chair. • Face towel is placed flat on table centered on patient with front long edge of towel at 8cm.line. • Filming Position (Side-Close).	Task Description: Patient picks up the towel with both hands, grasping the far concerns of the towel. The patient first folds the towel in half again across its center (widthwise). The second fold is done with the arm being tested only and is done from the side of the towel corresponding to the arm being tested. The folding does not need to be approximately aligned (within 1.5 inches). **Timing Procedure:** Starts on the word "Go" and ends when the towel is completely folded on the table. **Measure:** The time elapsed from the starting point to the moment the towel is completely folded on the table.	Verbal Instructions: • "Grasp the far corners of the towel and fold it lengthwise like this (demonstrate). Then fold it in half across its center by using your (state the side being tested) arm . try to get the ends of the towel must be close together. (demonstrate). In order to complete the task, the ends of the towel must be close together. Do the task as rapidly as possible. (repeat instructions) • "Do you have any questions?" • "Ready, set, go." **Scoring:** • FA scoring should take into account: 1) the extent to which the head and trunk are maintained in normal alignment, 2) the symmetry of the arms as they fold the towel for the first fold, and 3) the speed,fluidity and precision with which movements are performed. • The ends of the towel do not need to be exactly aligned after the second fold, but ends of the towel need to be approximately aligned(within 1.5 inches).

6(17). Lift baset

SET UP	TASK	VERBAL INSTRUCTIONS
Starting Position: • Patient standing and facing table. • Beside table (44" high) placed over the desk (29" high) on patient's side to be tested. The beside table extends along the width of the desk. • Basket at 8cm. line on the test table template, leading edge 14cm. from side edge of the table of side to be tested, handles (taped together) lined up with center of body. • Three-pound weight placed in basket. • Filming Position (Front).	Task Description: Patient attemps to pick up basket by grasping handle (from underneath the handle) and placing the basket on far edge of the rolling bedside table. The far edge of the basket should touch the far edge of the table. **Timing Procedure:** Starts on the word "Go" and ends when any portion of the base of the basket extends beyond the far edge of the bedside table. **Measure:** The time elapsed from the starting point to the moment the basket has been placed on the bedside table with any portion of the base of the basket beyond the far edge of the bedside table. (Note: release of the basket in not included in the time measure).	Verbal Instructions: • "Pick up the basket with your (state the side being tested) hand and place the basket on the rolling table. The far edge of the basket should go past the far edge of the beside table (demonstrate). Try not to move your feet while you do this task. Do this as quickly as you can." (repeat instructions) • "Do you have any questions?" • "Ready, set, go." Scoring: • FA scoring should take into accound the extent to which the head and trunk are maintained in normal alignment and the speed, fluidity, and precision with which movements are performed. • If the patient moves out of the original foot position, a maximum FA score of 3 should be assigned. • The task is demonstrated with the leading edge of the basket crossing the far edge of the beside table first. If other portions of the basket cross the far edge first, a maximum FA score of 3 should be assigned. • The task is demonstrated without rotating the trunk. If the patient significantly rotates their trunk during the task, a maximum FA score of 3 should be assign.

APPENDIX-2

NEUROLOGICAL ASSESSMENT FORM

Name :

Age :

Sex :

Occupation :

Residential Address :

Chief complaints :

Past medical history :

Present medical history :

Personal history

Family history :

Associated problems :

Drug history :

Vital signs:

Temperature :

Blood pressure :

Heart rate :

Respiratory rate :

OBJECTIVE EXAMINATION

ON OBSERVATION

Body Built :

Posture :

Attitude of limbs :

Muscle wasting :

Pattern of movement :

Gait :

Pressure sore :

External Appliances :

Deformities :

PALPATION

Muscle tone :

Oedema :

Tenderness :

Warmth :

ON EXAMINATION

HIGHER MENTAL FUNCTIONS

LEVEL OF CONSCIOUSNESS:

ORIENTATION

Person :

Place :

Time :

MEMORY

Immediate :

Recent :

Remote :

ATTENTION

COMMUNICATION

EMOTIONAL STATUS

2. HIGHER CORTICAL FUNCTION:

COGNITION

Fund of knowledge :

Calculation :

Proverb interpretation :

PERCEPTION

Body scheme/body image disorder :

Agnosia :

Apraxia :

3. CRANIAL NERVES :

4. SENSORY SYSTEM :

Superficial sensation :

Deep sensation :

Cortical sensation :

5. MOTOR SYSTEM

Muscle girth

Muscle girth	**Arm**	**Forearm**	**Thigh**	**Calf**
Right				
Left				

Muscle tone

UPPER LIMB	**LOWER LIMB**

Range of motion

Upper limb

	Side	**Shoulder**						**Elbow**		**Wrist**	
RT		**FLX**	**EXT**	**ABD**	**ADD**	**INT ROT**	**EXT ROT**	**FLX**	**EXT**	**FLX**	**EXT**
LT											

REFLEXES

SUPERFICIAL

Abdominal :

Plantar :

Corneal :

DEEP

Biceps :

Triceps :

Brachioradialis :

Ankle jerk :

Knee jerk :

6. INVOLANTARY MOVEMENTS:

7. BALANCE

Balance	Static	Dynamic
Sitting		
Standing		

8 .GAIT

Step length :

Stride length :

Width of base :

Cadence :

9. ASSISTIVE DEVICES :

10. PHYSICAL THERAPY DIAGNOSIS:

Direct impairments :

Indirect impairments :

Composite impairments :

Functional limitations :

11. INVESTIGATION :

12. CLINICAL DIAGNOSIS:

13. PHYSICAL THERAPY MANAGEMENT

14. HOME PROGRAMME :

APPENDIX-3

ETHICAL CLEARANCE

Ethically permission for the study will be obtained from the subjects and a written consent will be taken from each subject who participates in this study, As this study involve human subjects the Ethical Clearance has been obtained from the Ethical committee of Nandha college of Physiotherapy, Erode as per the ethical guidelines for Bio-medical research on human subjects, 2000 ICMR,(Indian Council of Medical Research) New Delhi.

APPENDIX-4

Written Informed Consent Form

NANDHA COLLEGE OF PHYSIOTHERAPY,

ERODE.

Informed consent form for the volunteers at "Nandha college of Physiotherapy, Erode", who will be participating in the research project entitled : "**THE EFFECT OF CONSTRAINT INDUCED MOVEMENT THERAPY FOR IMPROVING UPPER LIMB MOTOR FUNCTION IN MIDDLE CEREBRAL ARTERY STROKE PATIENTS – A COMPARATIVE STUDY".**

Name of Principal Investigator	**74104805** Under graduate student
Name of Organization	Department of Physiotherapy, Nandha college of Physiotherapy, Erode

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the research with you)**
- **Certificate of Consent (for signatures if you agree to take part)**

You will be given a copy of the full Informed Consent Form

PART I: Information Sheet

Introduction

I, undergraduate student in the Department of Physiotherapy, Nandha college of Physiotherapy,Erode, am working on my dissertation titled "**THE EFFECT OF CONSTRAINT INDUCED MOVEMENT THERAPY FOR IMPROVING UPPER LIMB MOTOR FUNCTION IN MIDDLE CEREBRAL ARTERY STROKE PATIENTS – A COMPARATIVE STUDY."**

I am going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research.

There may be some words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them and get yourself clarified.

Purpose of the research

Stroke is defined by WHO (1996) as a "Rapidly developed clinical signs of focal(or global)disturbance of cerebral function lasting more than 24 hours or leading to death with 50 apparent cause other than vascular origin".

Type of Research Intervention

In this study if you are selected, detailed history taking, clinical examination and routine investigations will be done.

Participant selection

Study group: Adult between age groups of 40-70 years presenting with history of MCA Stroke that occur following Contra lateral Hemiparesis (Worse in the arm and face than in the leg), Dysarthria, Hemianesthasia, Aphasia (if the dominant hemisphere is affected)

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. It will not affect our patient's treatment process.

Benefits

Personally you might be or may not be benefited in any way directly from the research. But by taking part in this research, you will be helping the scientific community.

Possible risks

There are no major physical risks for the person associated with these methods. Complications include exacerbation of symptoms after therapy which is rare possibility.

Reimbursements

You won't be given any monetary incentives or gifts for being a part of this research.

Confidentiality

The information that we collect from this research project will be kept confidential. Information about the patient that will be collected during the research will be put away and no-one but the researchers will be able to see it.

Right to Refuse or Withdraw

You do not have to take part in this research if you do not wish to do so. You may also stop participating in the research at any time you choose. It is your choice and all of your rights will still be respected.

Who to Contact

This proposal has been reviewed and approved by the Research and Ethical committee of Nandha college of physiotherapy,Erode, which is a committee whose task it is to make sure that research participants are protected from harm.

You can ask me any more questions about any part of the research study, if you wish to. Do you have any questions?

PART II: Certificate of Consent

I have read the foregoing information, or it has been read to me. I have been explained the procedure and complications. I am willing to participate in the study. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research.

Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

If illiterate a literate witness must sign (if possible, this person should be selected by the participant and should have no connection to the research team). Participants who are illiterate should include their thumb-print as well.

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Name of witness_____ Thumb print of participant

Signature of witness _____

Date _____

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following will be done:

1. Blood investigations:

    - Hb, TC, DC, ESR, RBS, Serum electrolytes, Blood Urea and Serum Creatinine.

2.Constraint Induced Movement Therapy

3. Conventional Physiotherapy.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this informed consent from has been provided to the participant.

Name of Researcher/person taking the consent_____

Signature of Researcher /person taking the consent_____

Date _____

Day/month/year

APPENDIX-5

PRE AND POST TEST SCORES OF EXPERIMENTAL GROUP ANDCONTROL GROUP

SL. NO.	EXPERIMENTAL GROUP		CONTROL GROUP	
	PRE TEST	POST TEST	PRE TEST	POST TEST
01	22	28	21	24
02	21	28	20	24
03	22	26	22	24
04	21	28	21	25
05	20	27	21	24
06	22	27	21	24
07	21	26	22	24
08	22	29	22	26
09	22	27	21	26
10	21	27	21	25
11	21	26	21	24
12	22	26	23	25
13	21	29	21	25
14	22	28	21	24
15	21	26	22	26